



VIRGINIA

COVID-19 Update November 19th, 2020

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A team of RAND researchers was asked by the Commonwealth of Virginia to review available information on COVID-19 models of the commonwealth to determine the strengths and weaknesses of each model and their relevance to decisionmaking. The work of the research team will be documented in a forthcoming RAND research report. The information in this presentation is intended to keep policymakers abreast of the latest findings of the research team.

This research was sponsored by the Commonwealth of Virginia and conducted by the RAND Corporation. RAND is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. For more information, visit www.rand.org.



Bottom-Line Up Front



Virginia's total case levels continued a rapid rise

- Counties in the southwest still have the highest case loads but the growth is widespread
- Hospitalizations rose rapidly
- Testing levels remain relatively high



Additional triggers could lead to a rapid rise in the coming months

- Seasonal changes
- Holiday interactions
- COVID-fatigue

Cheaper, faster testing or a vaccine could reduce the spread if widely deployed

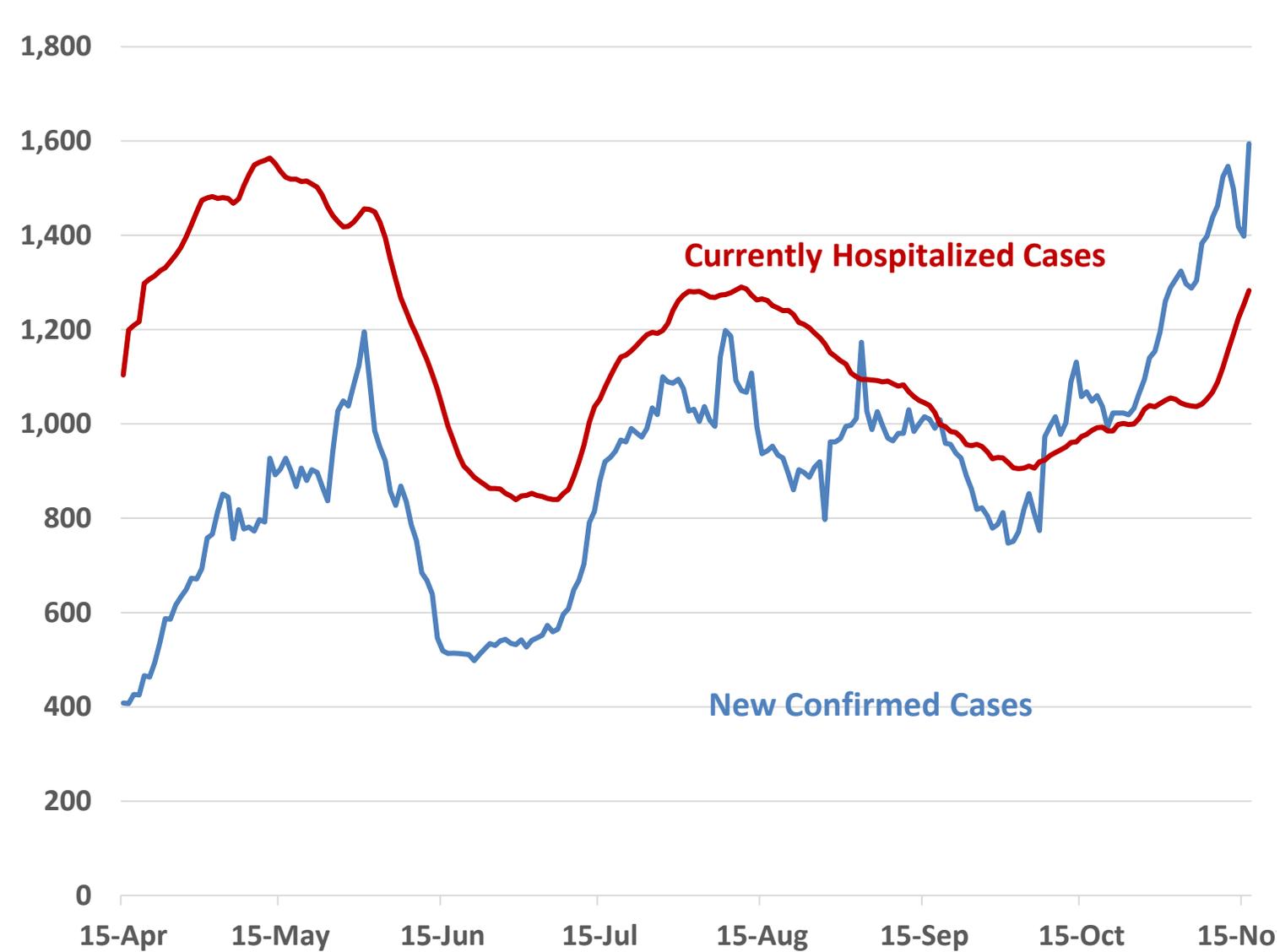


Modeling is less useful for forecasting because behavioral responses are driving current trends

- Models will continue to be very useful for comparing policies and exploring scenarios



Cases have continued to rise rapidly



New confirmed cases spiked and have reached 1,600/day on average

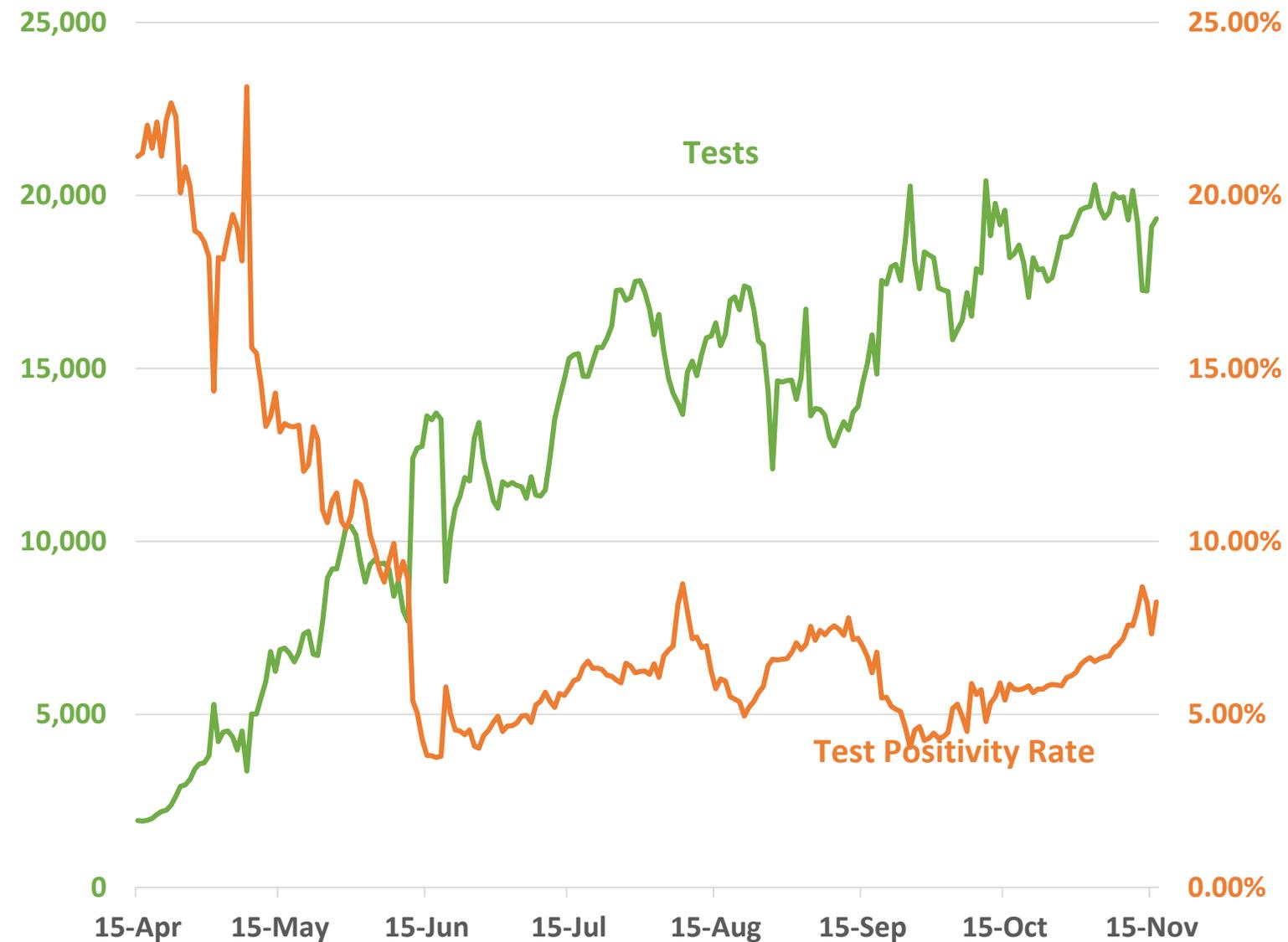
- The maximum for the second wave did not surpass 1,200/day
- This current wave is likely to be significantly worse than the summer

Currently hospitalized cases have risen to above 1,200

- This is a lagging indicator
- Hospitalizations are likely to continue to increase by a similar magnitude to the case rate (10-20%) in the next week or two



Testing levels are at the target range for a test-and-trace strategy



Tests per day are roughly 20,000

- Testing levels are appropriate for a test-and-trace strategy
- Further reopening is estimated to require four to five times more testing along with lower case rates (See Rockefeller Foundation)

The test positivity rate has increased to above 8 percent

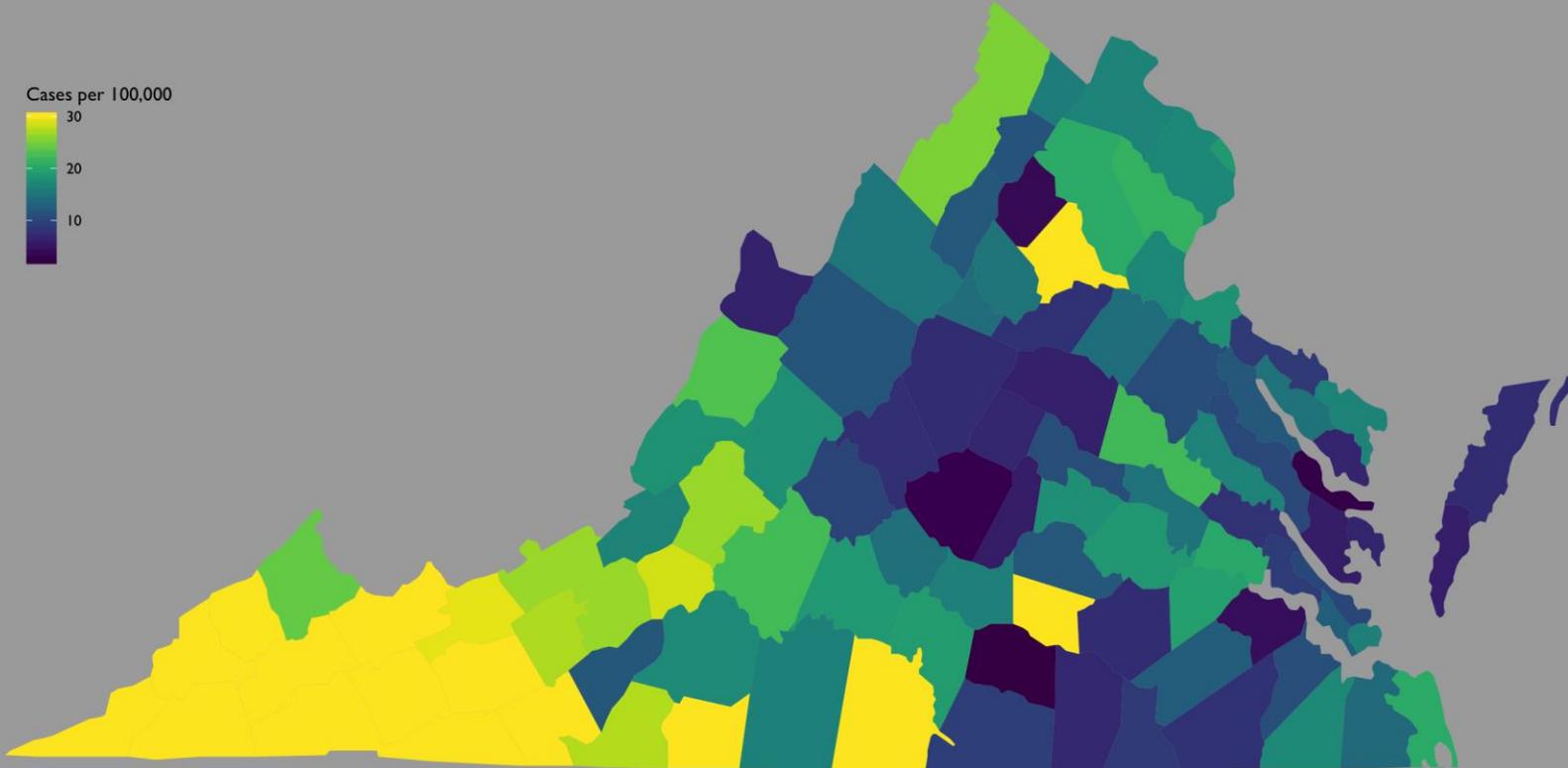
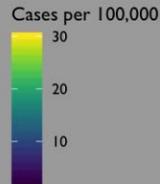
- Five percent is a suggested target
- Case rates increased while testing has remained roughly the same



Case rates have continued to grow statewide

CASE COUNT

Source: VDH



Yellow indicates at least 30 cases per 100,000

Virginia's Southwest Region counties continue to see the highest case levels

- Counties across the Commonwealth saw increases

Northern Virginia has also seen a rapid rise in cases but has not reached the levels of SW

These data were updated November 17th and represent a seven-day average of the previous week

Case rate trends in neighboring states have continued to get worse

Over the last 7 days, Virginia had 18.7 (+11% from last week) new confirmed cases per day per 100,000

Very high case loads (>20):

- Tennessee (65.1 new cases per 100k, +34% from last week)
- Kentucky (52.9, Kentucky +28%)
- West Virginia (41.9, +58%)
- North Carolina (26.4, +15%)
- Maryland (29.0, +62%)

High case loads (10-20):

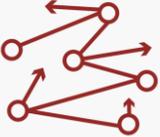
- District of Columbia (19.8, +51%)

Lower case loads (<10): None

These data were updated November 17th and represent a seven-day average of the previous week



We've been monitoring recent, relevant literature



Cherif et al. describe a strategy of massive testing to end the pandemic in the absence of a vaccine

- The authors use a simple model to show that testing the population every ten to twenty days can eliminate the spread in a couple of months
- The exact amount of time and number of tests required depends on the sensitivity of the test, with a more sensitive test resulting in a shorter period of testing (assuming high compliance with quarantine)
- Daily testing rates would need to be expanded 20-fold to deploy this strategy in Virginia



Denny et al. describe the use of a pooled surveillance testing program at Duke

- For the first portion of the fall semester, Duke tested its 10,265 students twice a week in pools of five
- The testing was paired with contact tracing and the tracing identified 27% of the total infections
- A total of 84 student had positive results, half of whom were asymptomatic at the time of the test
- A similar approach could be deployed in Virginia for high-risk areas such as dense housing units

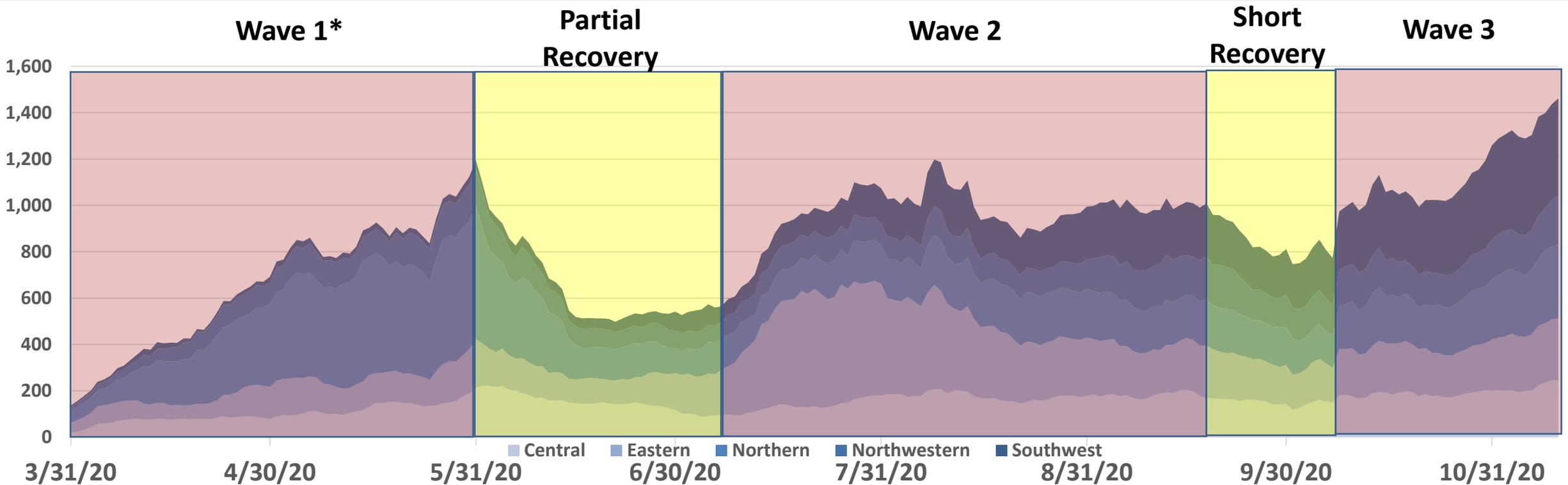


Laguarda et al. applied an artificial intelligence approach to diagnose COVID from cough recordings

- Using a balanced set of 5,320 recordings, the researchers applied an AI model to flag COVID cases
- The system matched a PCR test confirmation with 98.5% sensitivity and 94.2% specificity
- The study size and collection approach do not make this model directly appropriate for deployment, but a similar approach could be applied to produce a nearly free, rapid screening diagnostic



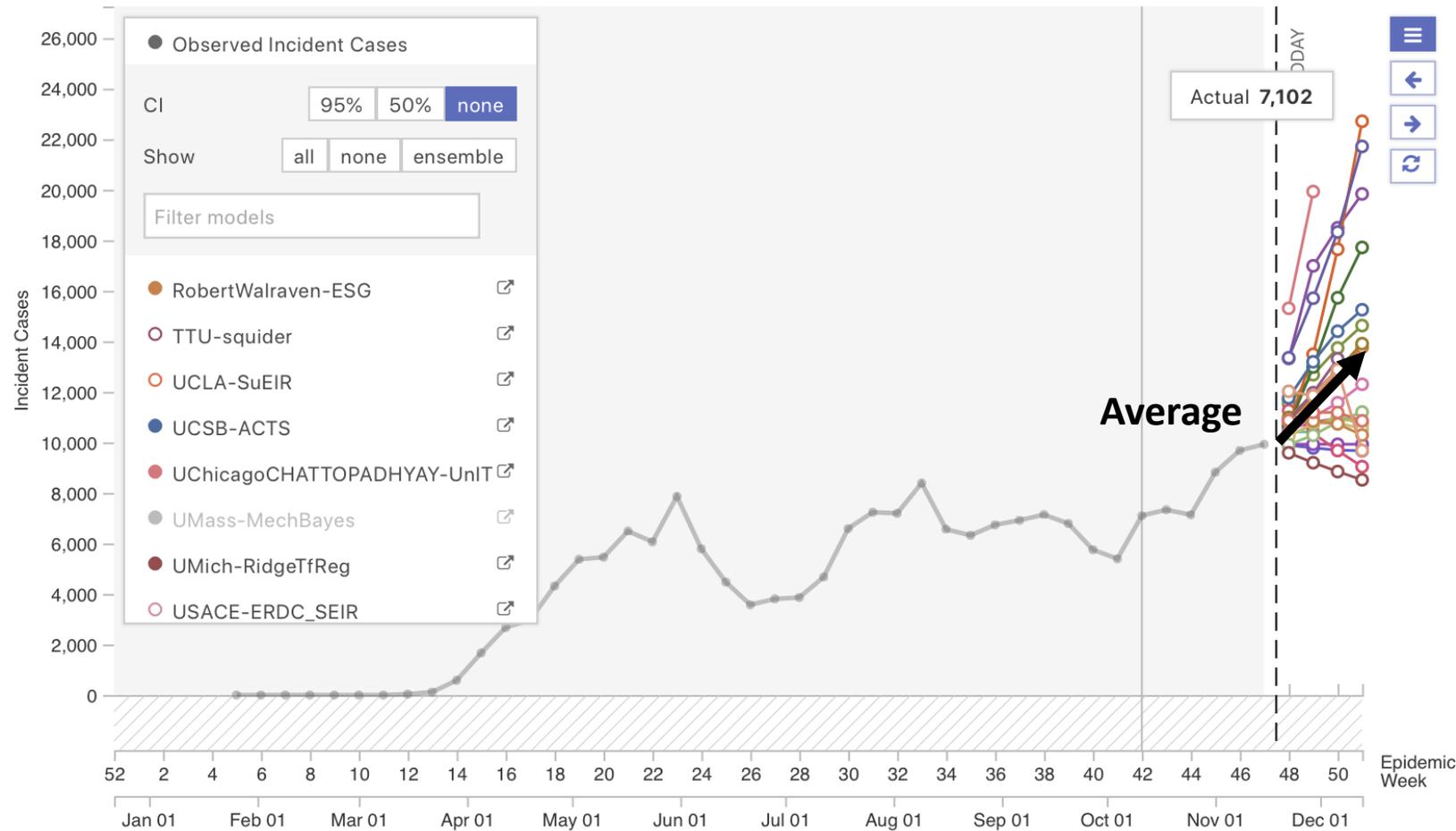
Each wave of cases has been centered in different parts of the Commonwealth



- The initial wave was concentrated in the Northern region*
- There was a partial recovery when cases in the Northern region dropped
- In mid-July, cases grew first in the Eastern region and then, beginning in August, statewide
- Statewide levels declined slightly, with a dip in the Eastern region in late September
- A new wave began in the Southwest region at the beginning of October and is spreading across the Commonwealth

*Testing was insufficient for accurate counts during the first wave

Forecasts of cases are diverging, but average to continued rise



There is substantial variation in the case forecasts

- The model “average” is for a rapid increase for the coming weeks

The mechanisms driving the spread at this stage are very different than in the early stage

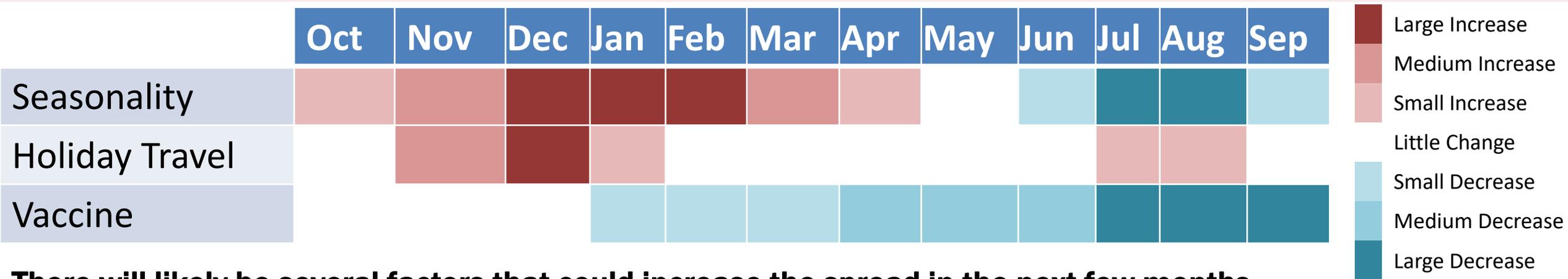
- Initially, people did not change their behavior, so COVID spread exponentially
- Increased tele-work, changing weather, the return of In-person instruction, and other factors changed the pattern of spread
- These new patterns require the models to evolve

Note: SEIR-type models have been cut from this figure due to poor fit
Source: COVID-19 Forecast Hub, <https://viz.covid19forecasthub.org/>
Accessed November 17th

For short-term forecasts, assuming last week's level is a good estimate



There are several triggers that could lead to increased spread



There will likely be several factors that could increase the spread in the next few months

- Seasonal effects for COVID-19 could lead to more spread during the colder months
- Holiday travel could lead to increased spread, particularly from the mixing of age cohorts

A vaccine may become available around the turn of the year

- It is unlikely that there will be sufficient supply initially to significantly reduce the spread
- People may scale back preventative behaviors (such as distancing and mask wearing) too soon

There are likely to be long-term repercussions that need planning and preparation to mitigate

- Mental health problems may persist, particularly among medical professionals and those directly affected
- Following the 1918 pandemic, there were higher rates of disability, mental illness, and other conditions



The risk of spread during Thanksgiving will vary by region and group size

Estimated likelihood at least one person has COVID by group size and region

Size	Central	Eastern	Northern	Northwestern	Southwest
5	5.3%	4.3%	5.3%	5.2%	9.5%
10	10.4%	8.4%	10.4%	10.2%	18.2%
15	15.2%	12.3%	15.2%	14.9%	26.0%
20	19.7%	16.1%	19.7%	19.3%	33.0%
25	24.0%	19.7%	24.0%	23.5%	39.4%
30	28.0%	23.2%	28.0%	27.5%	45.2%

We used the regional COVID prevalence to estimate the risk that at least one person would show up to Thanksgiving infected with COVID depending on the number of attendees

- Cross-border travel could raise the risk

In the Southwest, nearly 1 in 3 events with 20 people would be expected to have at least one attendee with COVID

- The odds are closer to 1 in 5 for most of the rest of the Commonwealth

The risk may be substantially larger by next week

Note: Assumes risk is based on 14-day case rate and only 20% of cases are detected

Source: Author’s calculations using data from COVID-19 Forecast Hub, <https://viz.covid19forecasthub.org/>

Accessed November 17th



There are interventions that could be applied to mitigate Thanksgiving spread

The recent restrictions should slow the rate of spread to the extent that they are followed

- Mask mandates and business closures have been shown to be effective in the literature
- Efforts to monitor and improve compliance may increase efficacy

Interventions targeting densely populated housing areas, essential workers, and 18-29-year-olds could further restrict the spread

- Expanded testing for these populations could improve early detection
- Pooled testing might be a way to quickly scale testing capacity

The health care system may need to take steps to enhance capacity

- Adjustments to procedure schedules may alleviate capacity stresses in December and January
- Mental health support may be needed for medical staff

There are additional responses that could be considered based on spread

- Coordinate responses with neighboring states
- Mandatory testing at airports and other transit points could reduce the spread from out-of-state travelers
- A two-week shutdown (potentially targeted) may be a useful mitigation after Thanksgiving to contain spread prior to the December holidays



Discussion and Questions